Smart Campus lost and found portal with IOT Sensors

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ABSTRACT –

In large institutions and universities, the efficient of tracking and verification of their individual items have been a challenging based on the current scenario.Heavily dependent on human's interventions, paper log and online forms are prone to errors, misplacement, and fraudulent claims. As a result, lost items often remain unclaimed for an extended periods or are taken by unauthorized individuals. Our paper is to propose an IOT based smart campus lost and found portal that automatically manages the lost and found items and retrieves it. The Project utilizes the RFID-tags, ultrasonic sensors and infrared sensors to detect and monitor the objects in a defined space. A centralized system (Firebase database) have been kept to receive instant notifications for the rightful owner via web- based portal. This process enhances the security, minimizes human-effort and ensures a transparent and reliable method of managing the lost things. By eliminating the insufficiencies of the manual – lost and found processes .Further the System's scalability ensures it may adopt beyond educational institutions like malls , corporate offices and public spaces . Through real-time tracking, automation, and seamless user interaction, the proposed system offers a technological advancement over traditional lost-and-found methods.

When an item is detected as lost, the system updates Firebase in real time and notifies the owner via a web-based portal, ensuring instant awareness and faster recovery. By leveraging *IoT automation*, this system enhances efficiency, reduces fraudulent claims, and ensures a *secure, transparent, and user-friendly* approach to managing lost belongings in large institutions. Its scalability makes it applicable to shopping malls, corporate offices, and public spaces, offering a *modernized lost-and-found solution.*

Keywords— Centralized Database1st .

1st – A *centralized database* is a *single, unified database system* that stores and manages all data in *one central location*, typically on a *single server or a group of interconnected servers.*

Introduction :

In the human work-flow dependency method is a traditional method which creates frustrations and delays for the belonging includes (students and faculty members) .May increases the risk of theft and unauthorized access t lost items in the absences of a secure and automated system. Introduces an "Smart IOT-based automated lost and found system " integrating the advanced technologies such as RFID, ultrasonic sensors and infrared rays sensors. RFID Tags are used to identify the real owners of the belonging. While ultrasonic and IR sensors are used to monitor the
removal or the presence of the objects . The system is connected to the Firebase which acts as a centralized cloud-based database allowing instant recording of this lost items and sending notifications to the owners. The instant notification system ensures that users are promptly .The instant notification system ensures that users are promptly informed about their lost items, while the centralized database eliminates the need for manual record-keeping. Furthermore, the integration of cloud storage and smart tracking makes this solution highly reliable and scalable, allowing its implementation beyond campus environments, such as shopping malls, corporate offices, and public spaces. This technologically advanced approach not only reduces human effort but also transforms lost-and-found management into a smart, automated, and user-friendly process, ensuring that lost items are recovered efficiently and securely. The management of lost and found items in educational institutions has been a persistent issue due to the lack of proper tracking and verification mechanisms. Most campuses still rely on manual processes, including paper records and online forms maintained by administrative staff. However, these methods are inefficient, error-prone, and unreliable, often leading to misplaced records, fraudulent claims, or lost items remaining unclaimed for years.

II. Iot Assistant Smart and lost Portal Overview :

This project *automates the entire process* by integrating *IoT-based tracking technologies* such as *RFID tags, ultrasonic sensors, and infrared sensors* to *detect, monitor, and track lost belongings* within a defined space. Traditional lost-and-found methods often rely on *manual processes, paper logs, and online forms*, leading to *errors, delays, and fraudulent claims.*
The system uses a *centralized database (Firebase)* to store real-time updates on lost and found items. When an item is detected as missing, it is immediately recorded in the database, and the rightful owner is *notified via a web-based portal*, ensuring *instant awareness and quick recovery*. The *scalable architecture* of the system allows for its implementation beyond educational institutions, making it *suitable for shopping malls, corporate*

offices, and other public spaces. This *innovative approach* provides a *user-friendly, secure, and efficient* alternative to *traditional lost-and-found methods*, ensuring *seamless user interaction, automated tracking, and fast retrieval* of lost items.

Software Specification :

Smart Campus lost and found portal with IOT Sensors built with IoT, based tracking technologies such as RFID tags,Centralized System (Firebase) to store real-time updates on lost and found items. When an item is detected as missing, it is immediately recorded in the database, and the rightful owner is *notified via a web-based portal*, ensuring *instant awareness and quick recovery*. By eliminating the insufficiencies of the manual – lost and found processes .Further the System's scalability ensures it may adopt beyond educational institutions like malls , corporate offices and public spaces . Through real-time tracking, automation, and seamless user interaction, the proposed system offers a technological advancement over traditional lost-and-found methods.

Existing System :

The existing *lost and found management systems* in institutions and public spaces rely heavily on *manual processes*, including *paper logbooks, online forms, and human verification*. These traditional methods are *inefficient, error-prone, and time-consuming*, often leading to *misplacement of records, fraudulent claims, and delayed itemrecovery*. Users typically need to *visit administrative offices or check notice boards* to inquire about their belongings, as there are *no instant notifications or real-time updates*.The *lack of a centralized system* results in *data inconsistencies, poor accessibility, and security risks*, often causing items to remain unclaimed or to be taken by unauthorized individuals. Overall, the existing system is outdated, slow, and highly dependent on human intervention, making it inefficient for large institutions and high-traffic public space

Proposed System :

Abbreviations and Acronyms
RFID – Radio Frequency Identification
IR – Infrared Sensor
DBMS – Database Management System
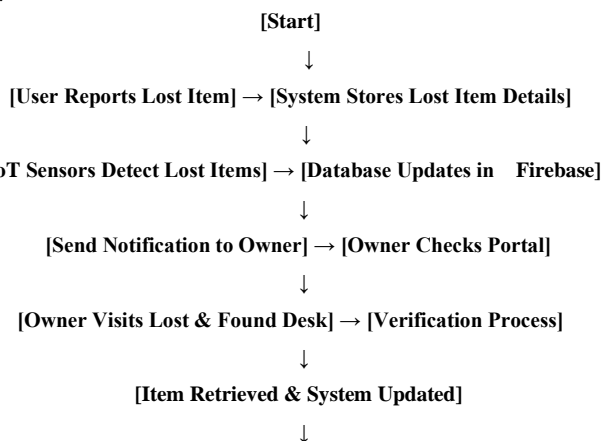**UI** – User Interface

B. Objective
Automated Detection and Tracking of Lost Items – Implement *RFID tags, ultrasonic sensors, and infrared sensors* to monitor and detect lost objects in real-time, eliminating the need for manual intervention.

Secure and Instant Notification System – Utilize a *centralized Firebase database* to store lost item records and send *instant alerts to rightful owners via a web-based portal*, ensuring quick recovery and reducing fraudulent claims.

Scalable and Efficient Lost-and-Found Management – Develop a versatile and expandable system that can be adapted beyond educational institutions to shopping malls, corporate offices, and public spaces, offering a modernized, technology-driven approach to lost-and-found processes.

C.Methodology
The *IoT-Based Smart Campus Lost and Found Portal* follows a structured methodology to ensure *efficient tracking, detection, and retrieval* of lost items. The system integrates *IoT sensors, RFID technology, and cloud-based storage* to automate the process, reducing manual intervention and improving security. The proposed system *automates lost-and-found management, enhances security, reduces fraudulent claims, and provides real-time tracking and notifications*. By leveraging *IoT, cloud computing, and automation*, it offers a *modernized, user-friendly, and scalable solution* to improve the efficiency of lost-and-found processes.

[Start]

↓

[User Reports Lost Item] → **[System Stores Lost Item Details]**

↓

[IoT Sensors Detect Lost Items] → **[Database Updates in   Firebase]**

↓

[Send Notification to Owner] → **[Owner Checks Portal]**

↓

[Owner Visits Lost & Found Desk] → **[Verification Process]**

↓

[Item Retrieved & System Updated]

↓

[End]

Fig 2: Activity diagram of proposed solution

Implementation of Project :

The implementation of the *IoT-Based Smart Campus Lost and Found Portal* integrates *IoT sensors, cloud storage, and a web-based platform* to automate the process of tracking and retrieving lost items efficiently. The system leverages *RFID tags and readers* to associate personal belongings with their owners, while *ultrasonic sensors* detect the presence or removal of objects in designated areas. Additionally, infrared (IR) sensor monitor unauthorized movement, ensuring real-time tracking of lost items. These hardware components work together to minimize human intervention and improve accuracy in identifying misplaced belongings.

On the software side, the system utilizes a Firebase cloud database to store lost-and-found records securely, enabling real-time synchronization of data across multiple devices. A web-based portal, developed using HTML, CSS, JavaScript, and backend frameworks like Node.js and Firebase API, allows users to report lost items, receive updates, and track their belongings. To ensure security, authentication mechanisms such as OTP-based verification or unique user credentials are implemented, preventing unauthorized access and fraudulent claims.

The system also incorporates real-time notifications and automation, where any detected lost item is immediately logged into the Firebase database, and the rightful owner is notified via the web portal. This real-time tracking system enables users to check the status and location of their lost items, improving the chances of quick recovery. To ensure efficiency and reliability, the system undergoes rigorous testing, including functionality testing to verify sensor accuracy, database testing to confirm real-time updates, and security testing to prevent unauthorized access to stored information.

For deployment, the system is initially implemented in educational institutions, where lost items are a common issue. However, its scalability allows it to be extended to shopping malls, corporate offices, and public spaces, making it a versatile and efficient lost-and-found solution. With cloud-based infrastructure, the system can be expanded with minimal modifications. Overall, the implementation of this project enhances security, reduces human effort, and automates the retrieval of lost belongings, offering a modern, user-friendly and scalable approach to lost-and-found management.
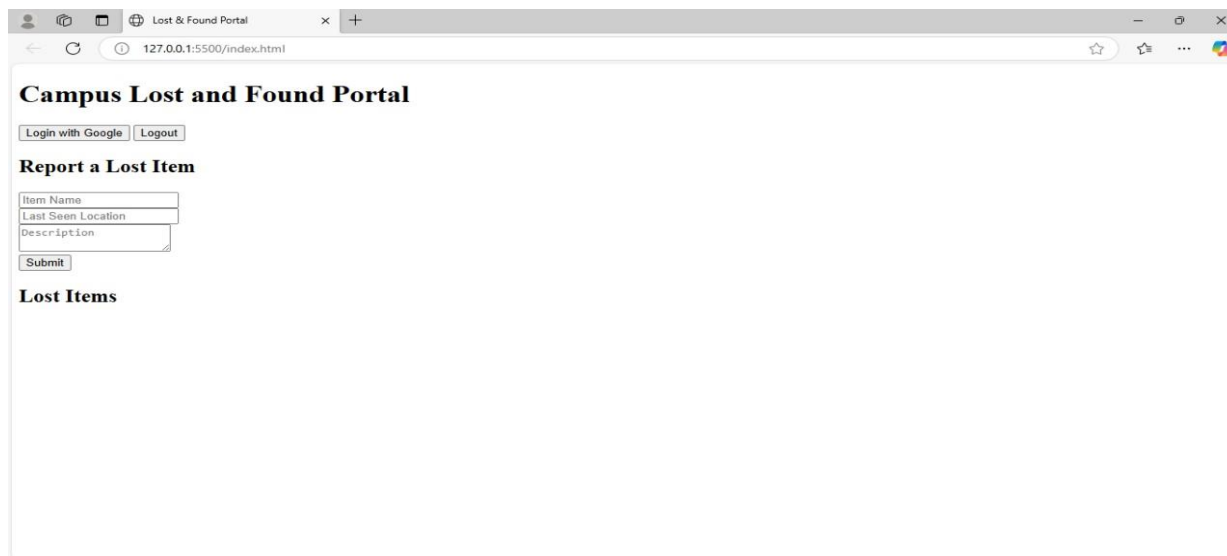
INTERFACE OF WEBPAGE:

Fig4: Output of the interface.

Advantage

- **Automated Tracking & Detection** – The system automatically detects lost items using RFID, ultrasonic, and IR sensors, reducing reliance on manual tracking.
- **Real-Time Notifications** – Owners receive instant alerts via the web-based portal when their lost item is detected, enabling faster recovery.
- **Minimizes Human Effort** – Reduces the need for manual record-keeping and verification, making the lost-and-found process more efficient and hassle-free.
- **Enhanced Security & Fraud Prevention** – Ensures that only rightful owners can retrieve lost items through authentication and verification mechanisms, preventing fraudulent claims.

- **Centralized Cloud Storage (Firebase Database)** – Maintains secure and organized records of lost and found items, accessible in real-time from multiple devices.
- **User-Friendly Web-Based Portal** – Provides a simple interface for users to report, track, and retrieve their lost belongings with ease.
- **Scalability & Versatility** – The system can be expanded beyond campuses to shopping malls**,** corporate offices, and public spaces, offering a flexible and adaptable solution.

FUTURE WORK :

- **Expansion to Large-Scale Public Spaces –** The system can be *implemented in shopping malls, airports, railway stations, corporate offices, and public places*, ensuring *efficient lost-and-found management beyond educational institutions*.
- **GPS-Based Item Tracking –** Future upgrades can include *GPS-enabled RFID tags*, allowing users to *track their lost items' exact locations* in real time, enhancing accuracy and recovery speed.
- **Blockchain for Security & Authentication** – Implementing *blockchain technology* can improve *data security, prevent tampering, and ensure transparent ownership verification*, making the system more robust against fraudulent claims.
- **Multi-Language & Voice Assistance** – Adding *multi-language support and voice-assisted features* would make the system more *inclusive and accessible* to a wider range of users.
- **Iot-Enabled Wearable Technology** – RFID or Bluetooth-enabled wearables (such as smart badges or keychains) can be introduced to help users locate their belongings instantly.
- **Cloud-Based AI Chatbots for User Assistance** – Implementing an AI-powered chatbot on the web portal or mobile app can assist users in reporting lost items, checking status, and guiding them through the retrieval process efficiently.

REFERENCES :

1. Hossain, M. Ullah, M. Parvez, M. Uddin, M. Howlader – Design and Implementation of ThirdEye: Lost & Found System.

2. Pushpa Choudhary, Akhilesh Kumar Choudhary, Arun Pratap Srivastava, Arjun Singh – Find Mine: Find the Lost Items via Mobile App

3. G. Sowjanya, S. Nagaraju – Design and Implementation of Door Access Control and Security System Based on IoT

4. Mohammad Wazid, Ashok Kumar Das, Rasheed Hussain, Giancarlo Succi, Joel J.P.C. Rodrigues –Authentication in Cloud-Driven IoT-Based Big Data Environment: Survey and Outlook

5. Nur Fatiehah Iylia Binti Muhamad Ilias – A Web-Based System for Lost and Found Items Using RFID and Email Notification (Universiti Teknologi MARA).

6. P. Kumar, A. K. Verma, and S. Kumar – IoT-Based Smart Tracking System for Lost Items

7. L. Zhang, Y. Liu, X. Wang – RFID-Based Item Tracking and Management System in Smart Environments

8. M. A. Rahman, T. Sultana, M. S. Hossain – IoT-Based Smart Notification and Tracking System for Lost Items

9. J. Smith, D. Brown, R. Wilson – Cloud-Based IoT Framework for Secure Lost and Found Systems

10. Williams and C. Brown – Automation in Lost and Found Systems: A Comparative Study.